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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/738,003 | 12/14/2000 | Mark S. Young | 003829.P001 | 1404 |

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EXAMINER

ENCARNACION, YAMIR

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2186

DATE MAILED: 03/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/738,003

Applicant(s)

YOUNG, MARK S.

Examiner

Yamir Encarnacion

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 11, 12 and 14-20 is/are rejected.
- 7) ☒ Claim(s) 10, 12 and 13 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other: _____

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DETAILED ACTION

Claim Objections

1. Claim 12 is objected to because of the following informalities:

The claim states “the access has being independent of the data path.” Perhaps applicant meant “the access path being independent of the data path.” Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by *Lentz* (USPN: 5,754,800).

Lentz allocates priorities to various devices based on the number of times that they have been serviced. See column 14, lines 40-48. Also, see column 15, lines 8-11 which state that “[e]very time the IOU is granted use of the port, a counter is decremented. Once the counter reaches zero, the IOU is considered as hogging the bus and the priority level of the IOU is decreased.” As interpreted, the updating of the counter every time an IOU is granted use of a port anticipates the claimed “monitoring.” Also, the decreasing of the priority level for an IOU hogging the bus anticipates the claimed “assigning a priority.”

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Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 12, 15-17, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shibuya* (USPN: 6,185,647 B1) alone, or alternatively, in view of *Cohen* (USPN: 6,073,199).

| Claimed | <i>Shibuya</i> |
|---|--|
| 19. A method for data transfer arbitration comprising: monitoring data transfers for a plurality of devices; and | Column 4, lines 10-14 state that an “algorithm for deciding the priority by the priority decision circuit 26 includes counting over a specified period of time the number of accesses of the host computer 10 to the device circuits 22-1 to 22-4 connected to the slots 20-1 to 20-4.” In the alternative, see the counter 52 shown on figure 6. |

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| <p>assigning a priority to each device corresponding to the amount of data transfers generated by the device.</p> | <p>Column 4, lines 14-18 state that “[t]he priority decision circuit 26, setting a higher priority when the number of accesses is equal to or more than a predetermined threshold value and setting a lower priority when the number of times of access is less than the predetermined threshold value.” Also, column 8, lines 45-46 state that “the priorities are determined on the basis of the frequencies of access to a plurality of slots.”</p> <p>In the alternative, see the priority decision circuit 48 in figure 5. Also, column 8, lines 63-68 state that “mapping is effected so that a slot having a higher access frequency is connected to the slot position having a higher priority on the bus and that a slot having a lower access frequency is connected to the slot position having a lower priority on the bus.”</p> |
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While *Shibuya* does not clearly explain that the “data transfers generated [are] by the device[s]” connected to the slots 20-1, 20-2, 20-3, and 20-4, it is noted that *Shibuya* explicitly states that these devices could be a keyboard and a communication modem. See column 3, lines 58-59. It would have been obvious to a person of ordinary skill in the art that keyboards generate data transfers. Also, modems receiving incoming communications generate data transfers. For that reason, claim 19 is rendered unpatentable by *Shibuya*.

In the alternative, *Cohen* describes of commercially available devices connected to a bus that “can be either an initiator of a bus transaction or the target of a bus transaction.” See column 3, lines 59-63. Assuming *arguendo* that the devices connected to the slots in *Shibuya* did not initiate transactions, those of ordinary skill in the art would have found it obvious to use commercially available devices such as the ones described by *Cohen* for the purpose of reducing the time to market.

As to claim 1 and the claimed “crossbar” note the bus mapping circuits described by *Shibuya*. As to the claimed “memory,” it would have been obvious to a person of ordinary skill in the art that the host computer 10 of *Shibuya* would have comprised a microprocessor. The examiner takes “Official notice” that microprocessors are commonly coupled to memory caches which store data on its way to the microprocessor. A cache coupled to a microprocessor storing the data on its way to the microprocessor would have read on the claimed memory.

As to claim 2, see the comments for claim 1 above.

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As to claim 12 and the limitation requiring “the access path being independent of the data path.” The examiner takes “Official notice” that “split busses” were known prior to the time of filing. A person of ordinary skill in the art would have found it obvious to modify *Shibuya* or the *Shibuya/Cohen* combination so as to use a split bus for the purpose of maximizing bus utilization given that systems utilizing a split bus allow for bus pipelining.

As to claims 15-16, the access counters of *Shibuya* render the limitations of the claims obvious.

As to claim 17, in *Shibuya* priority is adjusted based on access frequency. Since the bandwidth demand of each slot is a function of access frequency, *Shibuya* and the *Shibuya/Cohen* combination render the claimed limitation obvious.

6. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Fischer* (USPN: 6,513,082 B1).

| Claimed | <i>Fischer</i> |
|---|---|
| 19. A method for data transfer arbitration comprising: monitoring data transfers for a plurality of devices; and | Column 10, lines 64-65 discloses of “a bus monitor [] to monitor usage of a system bus by a plurality of agents.” |

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| <p>assigning a priority to each device corresponding to the amount of data transfers generated by the device.</p> | <p>Column 10, line 66 thru column 11, lines 3 discloses of “an arbiter [] to adaptively grant usage of said system bus to said plurality of agents based on monitored usage of said system bus by respective ones of said of plurality of agents.” It would have been obvious to those of ordinary skill in the art that bus usage comprised transferring data. The examiner notes that table 3 in column 7 shows that the system described by <i>Fischer</i> monitored the number “of individual read or write bus transactions per agent cycle slot.”</p> |
|---|---|

7. Claims 1-2, 4-9, 11-12, 14-17, and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Foster* (USPN: 6,038,630) in view of *Fischer* (USPN: 6,513,082 B1).

| Claimed | <i>Foster</i> |
|-----------------------------|---|
| 1. An apparatus comprising: | See figure 2. |
| a memory; | See figure 2, the SDRAM 210 and the DRAM 220. |

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| a plurality of functional units that transfer data to and from the memory; | See figure 2, the processor 213 and the audio decoder 217 coupled to internal data bus 1 and internal data bus 2. |
| a crossbar that provides a data path from each unit to the memory, [wherein the crossbar comprises an arbitration unit to monitor data traffic generated by each of the plurality of functional units through the crossbar and assigns a priority to each functional unit based on the data traffic]. | See figure 3, the crossbar switch 240. |

While *Foster* explains that the abritrator 235 in crossbar switch 240 “can be implemented using any one of various arbitration schemes” (See column 5, lines 37-38), none of the arbitration schemes described in *Foster* explicitly disclose of “monitor[ing] data traffic generated by each of the plurality of functional units through the crossbar and assign[ing] a priority to each functional unit based on the data traffic.”

Fischer discloses of a system that prioritizes agents based on monitored usage of the system bus by the agents. A person of ordinary skill in the art would have been motivated to modify *Foster* so as to use an arbitration scheme based on historical information like the one described by *Fischer* for the purpose of improving system performance and perhaps power consumption. See

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Fischer column 5, lines 19-21. Therefore, it would have been obvious to a person of ordinary skill in the art to modify *Foster* so as to use an arbitration scheme based on historical information like the one described by *Fischer* because the *Foster/Fischer* combination would have achieved improved system performance and perhaps power consumption.

As to claim 2, see *Fischer* column 7, lines 20-33.

As to claims 4-7, in adaptive mode *Fischer* allows round robin allocation (which reads on the “fixed priority scheme”). Also, *Fischer* uses a programmed system cycle sequence to determine which bus master to grant ownership to next (which reads on the “programmable priority scheme”). See *Fischer*, column 8, lines 39-48.

As to claim 8, see *Fischer* column 8, lines 42-44.

As to claim 9, it would have been obvious to a person of ordinary skill in the art that a requested resource would have to be available for the request to be granted.

As to claim 11, see *Fischer*, column 8, lines 44-48.

As to claim 12 and the limitation requiring “the access path being independent of the data path.” The examiner takes “Official notice” that “split busses” were known prior to the time of filing. A person of ordinary skill in the art would have found it obvious to modify the *Foster/Fischer* combination so as to use a split bus for the purpose of maximizing bus utilization given that systems utilizing a split bus allow for bus pipelining.

As to claim 14, *Fischer* suggests of registers for changing the priorities. See *Fischer*, column 3, lines 41-43 and column 5, lines 38-39.

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As to claims 15, see the statistics registers 204 in figure 2 of *Fischer*.

As to claim 16, see *Fischer*, column 7, lines 20-33.

As to claim 17, in *Fischer* priority is adjusted based on monitored usage. Since the bandwidth demand is a function of monitored usage, the *Foster/Fischer* combination renders the claim obvious.

As to claims 19-20, see the comments for claim 1 above.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the *Foster/Fischer* combination as applied to claim 1 above, and further in view of *Hill* (USPN: 6,499,090 B1).

As to claim 3, the *Foster/Fischer* combination does not monitor the type of data that each functional unit transfers.

Hill teaches of prioritizing according to data type. See *Hill*, abstract. A person of ordinary skill in the art would have found it obvious to modify the *Foster/Fischer* combination so as to prioritize requests based on data type as was done by *Hill* for the purpose of improving performance.

9. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the *Foster/Fischer* combination as applied to claim 15 above, and further in view of *Yakashiro* (USPN: 6,226,702 B1).

As to claim 18, the *Foster/Fischer* combination does not adjust priorities based on delays in getting requests serviced.

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Yakashiro teaches of prioritizing requests based on their waiting time. See *Yakashiro*, column 20, line 25 thru column 21, line 16. A person of ordinary skill in the art would have been motivated to modify the *Foster/Fischer* combination so as to take into account each request's waiting time as was done in *Yakashiro* for the purpose of preventing starvation and increasing efficiency of the bus usage. See *Yakashiro* column 21, lines 11-16. Accordingly, it would have been obvious to modify the *Foster/Fischer* combination so as to take into account each request's waiting time as was done in *Yakashiro* because the *Foster/Fischer/Yakashiro* combination would have prevented starvation and increased efficiency of the bus usage.

Allowable Subject Matter

10. Claims 10 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this or an earlier communication from the Examiner should be directed to Yamir Encarnacion by phone at (703) 308-5466.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim, can be reached on (703) 305-3821.

Any formal response to this action intended for entry should be mailed to Commissioner of Patents and Trademarks, Washington, D.C. 20231 or faxed to (703) 746-7239 and labeled "FORMAL" or "OFFICIAL." Any informal or draft communication should be faxed to (703)

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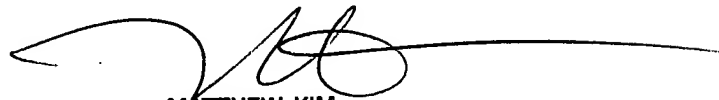
746-7240 and labeled "INFORMAL" or "UNOFFICIAL" or "DRAFT" or "PROPOSED" and followed by a phone call to the Examiner at the above number. Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

YEE

Yamir Encarnacion

Patent Examiner

March 19, 2003



MATTHEW KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100